VANDERBILT
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Child Health Policy

Current Knowledge & Gaps in Care for Infants with NAS

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I have no conflicts of interest to disclose.

SUBSTANCE USE IS COMMON IN PREGNANCY

Illicit drug use in pregnancy (2015)
- 7.4% - pregnant women 18 to 25 years old
- 4.7% - 15-44 years (less than non-pregnant 12.5%)

Legal drugs in pregnancy
- 13.6% smoke cigarettes (11.4% in 2014)
- 9.3% use alcohol (8.8% in 2014)

440,000 infants exposed to illicit drugs and alcohol per year
- Only 5% detected at birth

Substance Abuse and Mental Health Services Administration. Results from the 2015 National Survey on Drug Use and Health: Summary of National Findings. Rockville, MD: Substance Abuse and Mental Health Services Administration;2016.

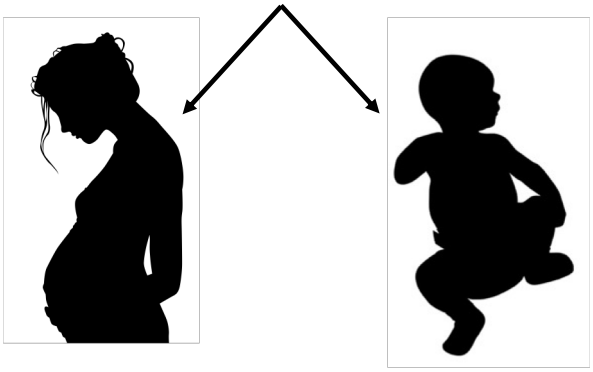
Young N, et al. Substance-Exposed Infants: State Responses to the Problem. Rockville, MD: Substance Abuse and Mental Health Services Administration;2009.

OPIOID AGONIST THERAPIES IMPROVE OUTCOMES

Buprenorphine and methadone

Recommended to treat opioid use disorder in pregnancy

Decreased risk of overdose death, relapse, HCV, HIV



More likely to go to term, higher birthweights

Risk of newborn drug withdrawal

NEONATAL ABSTINENCE SYNDROME

- **A withdrawal syndrome experienced by drug exposed newborns after birth**
- Generally follows opioid exposure, though other drugs have been implicated
  - Alcohol, benzodiazepines (valium, etc.), barbiturates (phenobarbital, etc.)
- 40-80% of methadone exposed newborns develop NAS
  - ~5% of those exposed to opioid pain relievers

NAS TREATMENT

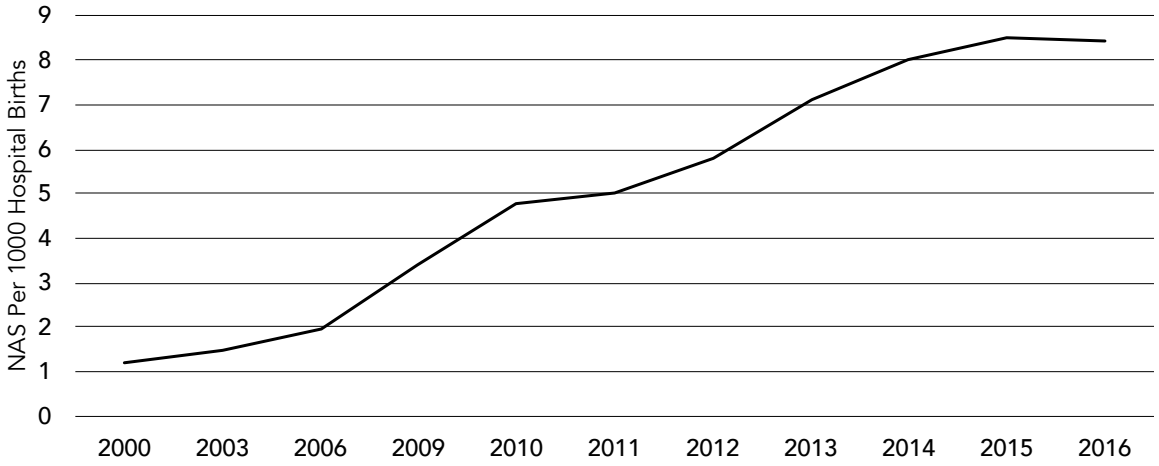
Goal of treatment: to "control" withdrawal, minimizing complications (e.g. seizure)

Non-pharmacologic intervention (e.g. environmental controls, etc)

- Rooming in, Breastfeeding

Involves using opioids (morphine, methadone) and slowing decreasing dose

Incidence of NAS in the US, 2000-2016



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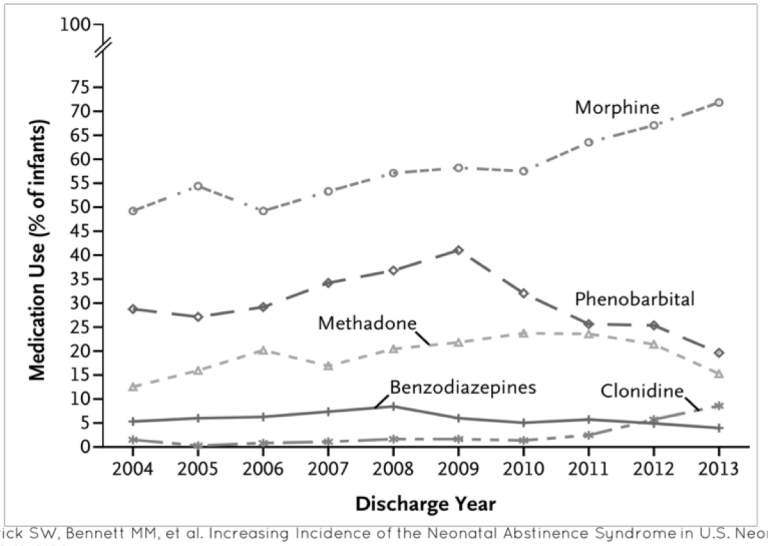
Winkelman TNA, Villapiano N, Kozhimannil KB, Davis MM, Patrick SW. Neonatal Abstinence Syndrome - Incidence and Costs Among Infants Enrolled in Medicaid, 2004-2014. Pediatrics. 2018 Apr;141(4).

Hospital Variability

- There remain significant inter and intra-hospital variation in treatment and outcomes for NAS
- Recent study of US children's hospitals:
  - Only 5/14 used the same pharmacotherapy >80% of the time
  - Two-fold differences in risk-adjusted length of stay
- Large international quality improvement collaborative of 199 hospitals
  - 44.8% had a policy to standardize scoring
  - 48.6% had a policy on breastfeeding a substance-exposed infant
  - 68.0% had a policy on pharmacologic treatment of NAS

Patrick SW, Kaplan HC, Passarella M, Davis MM, Lorch SA. Variation in treatment of neonatal abstinence syndrome in US Children's Hospitals, 2004-2011. J Perinatol. 2014.
Patrick SW, Schumacher RE, Horbar JD, et al. Improving Care for Neonatal Abstinence Syndrome. Pediatrics. 2016;137(5).

Treatment Variation for NAS



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Standardizing Care Works

Ohio perinatal collaborative, multicenter cohort

- Protocol driven weans vs. no protocol - with shorter LOT (17.7 vs. 32.1 days, $p<0.001$)

Vermont Oxford Network NAS collaborative 2013-2015

- Participating hospitals, care standardized by protocol/policy development
- Shortened LOT (16 -> 15, p=0.02) and LOS (21 -> 19, p=0.002)
- Hospitals with protocols/policies on infant scoring lowest LOS −3.1 days (95%CI −4.9, −1.4)

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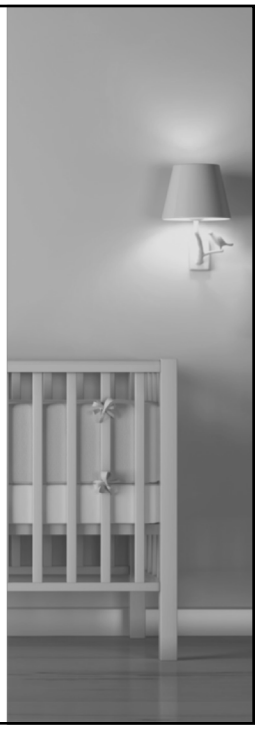
AFTER DISCHARGE FROM HOSPITAL

Recent focus on **reducing LOS**

- Infants with NAS 2x as likely to be readmitted in 30 days than uncomplicated term infants
  - Short LOS increase risk or readmission

Hepatitis C Virus an Emerging Threat

- Rate of pregnant women doubled in US from 2009-2014
- Vertical transmission rate ~6%, must be followed post-discharge
  - Philadelphia – 16% exposed tested
  - Wisconsin – 34% exposed tested



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Kuncio DE, Newbern EC, Johnson CC, Viner KM. Failure to Test and Identify Perinatally Infected Children Born to Hepatitis C-Positive Women. Clin Infect Dis. 2016.

Watts T, Stockman L, Martin J, Guilfoyle S, Vergeront JM. Increased Risk for Mother-to-Infant Transmission of Hepatitis C Virus Among Medicaid Recipients - Wisconsin, 2011-2015. MMWR Morbidity and mortality weekly report. 2017;66(42):1136-1139

INPATIENT vs OUTPATIENT TREATMENT

46%

of infants medicated for NAS are treated as **outpatients**

Outpatient therapy is 3x longer

Median length of treatment: 19 days for inpatients & 60 days for outpatients

ED utilization is higher for outpatients

42% of outpatient infants had at least 1 ER visit within six months, compared to 36% of inpatients

89% of outpatients: treated with phenobarbital

Which has been associated with poor neurologic outcomes

Maalouf, F.I., Cooper, W.O., Slaughter, J.C., Dudley, J., & Patrick, S.W. (2018). Outpatient Pharmacotherapy for Neonatal Abstinence Syndrome. The Journal of Pediatrics, 7(1). Funding: NIH National Institute on Drug Abuse Grant K23DA038720.

WHAT DOES OPTIMAL DISCHARGE LOOK LIKE?

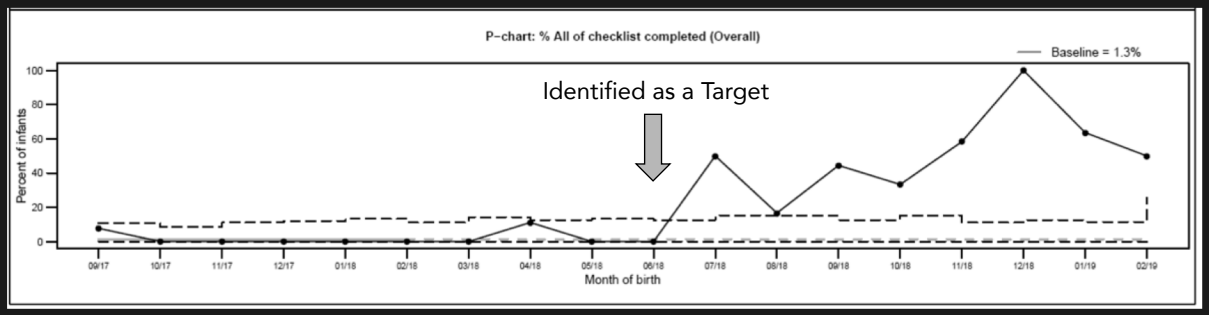
Starts with training/bonding during the birth hospitalization

- Breastfeeding
- Engaging family
- Assesses family needs/follow-up
- Assesses other risks, including HCV

Considers post-discharge needs

- Home Visitation
- Child Welfare
- IDEA Part C (Early Intervention)
- More frequent pediatrician follow-up
- Coordinate with maternal treatment

IMPROVING DISCHARGE



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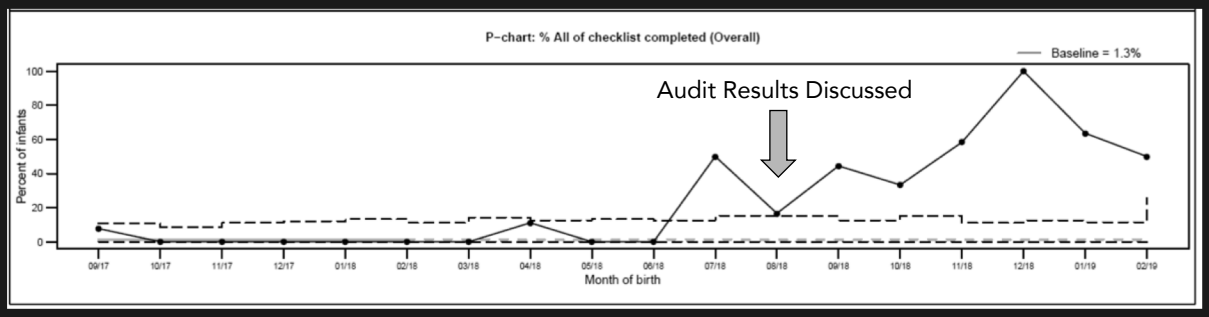
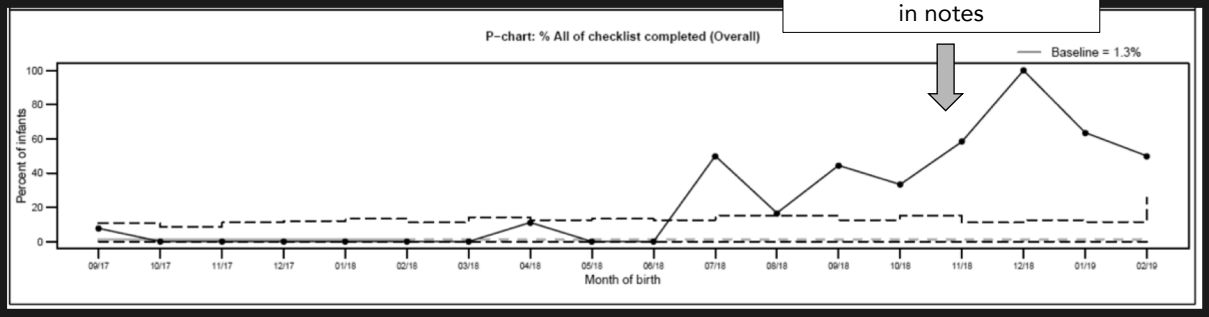


IMPROVING DISCHARGE

Checklists, education of residents, documentation in notes



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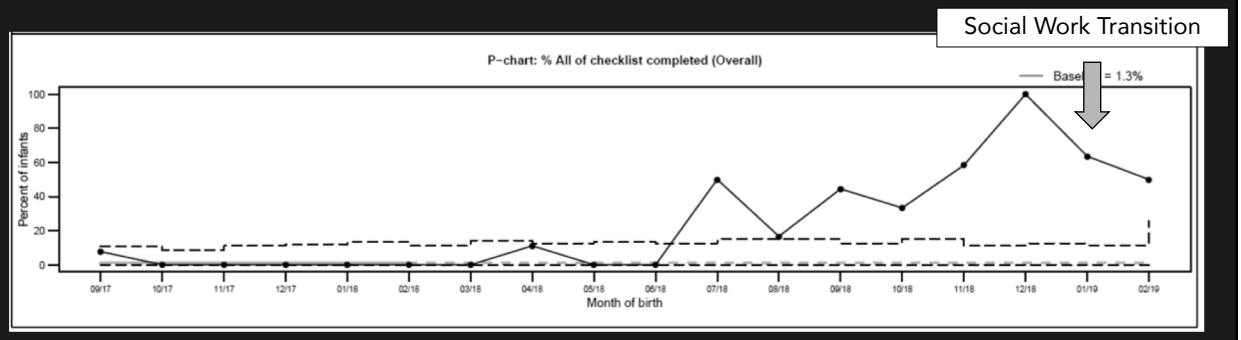

LONG-TERM OUTCOMES INADEQUATE

- May fail to account for:
  - Additional substances
  - Social stressors
  - Adverse child experiences
  - Trauma
  - Environment
  - Maternal (e.g., OAT and mental health) and infant treatment (e.g., long taper)
- In some studies, adverse outcomes may be a proxy for social and economic hardship.

POSSIBILITIES

- Standardize definitions, beginning with NAS
- Improve inpatient tools for diagnosis and treatment
- Use data to standardize the discharge process, fill in gaps
  - Developmental follow-up
  - Early Intervention
  - Other common co-morbidities for mom and baby (e.g., mental health, HCV)
- Early identification of developmental risks
  - Developmental readiness, ready to learn
- Connection with providers, resources, schools
  - Improved health
- Data harmonization as a tool to break siloes

SUMMARY

- Pregnant women and infants affected by opioids face a system that contains gaps
  - Standardization
  - Coordination
- There is a substantial need for improved data coordination from pregnancy through childhood
- This process could also lead to improvements in case definitions and a common language


Questions?
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